HIGHLIGHTED ARTICLES

Influence of El Niño on atmospheric CO_2 over the tropical Pacific Ocean: Findings from NASA's OCO-2 mission
Science(34.661)

The impact of anthropogenic land use/land cover change on regional climate extremes
Nature Communications (12.124)

A communal catalogue reveals Earth's multiscale microbial diversity
Nature (40.137)

Sea turtle bycatch mitigation in U.S. longline fisheries
Frontiers in Marine Science (N/A)

Comparative application of trophic ecosystem models to evaluate drivers of endangered Hawaiian monk seal populations
Marine Ecology Progress Series (2.619)

CROSS LINE OFFICE ARTICLES

Biogeography of seabirds within a high-latitude ecosystem: Use of a data assimilative ocean model to assess impacts of mesoscale oceanography
Journal of Marine Systems (2.608)

The role of shellfish aquaculture in reduction of eutrophication in an urban estuary
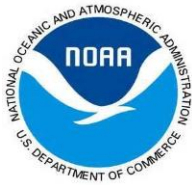Environmental Science & Technology (5.330)

Brevetoxin exposure in sea turtles in south Texas during *Karenia brevis* red tide
Diseases of Aquatic Organisms (2.71)

Continuous light absorption photometer for long-term studies
Atmospheric Measurement Techniques (3.089)

Timing of sea-ice-retreat affects the distribution of seabirds and their prey in the southeastern Bering Sea
Marine Ecology Progress Series (2.619)

ADDITIONAL ARTICLES

NMFS Publications

Evaluation of robust single-species harvest control rules for managing reef fish in the Gulf of Mexico
Marine and Coastal Fisheries (1.810)

Modeling local adaptation and gene flow in sockeye salmon
Ecosphere (2.595)

Two new species of Suberitida (*Porifera, Heteroscleromorpha*) from the Bering Sea
Zootaxa (0.994)

Expanding the coastal forager paradigm: Long-term pelagic habitat use by green turtles (*Chelonia mydas*) in the eastern Pacific Ocean
Marine Ecology Progress Series (2.619)

Otolith chemistry of juvenile walleye pollock (*Gadus chalcogrammus*) in relation to regional hydrography: Evidence of spatially split cohorts
Marine Ecology Progress Series (2.619)

Exploring public knowledge, attitudes, and perceptions of the Marianas Trench Marine National Monument
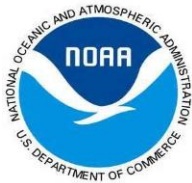Coastal Management (1.861)

NWS Publications

Observations of right-moving supercell motion forecast errors
Weather and Forecasting (1.972)

NESDIS Publications

[Quantitative assessment of carbon sequestration reduction induced by disturbances in temperate Eurasian steppe](#)
Environmental Research Letters (3.906)

HIGHLIGHTED ARTICLES

Influence of El Niño on atmospheric CO_2 over the tropical Pacific Ocean: Findings from NASA's OCO-2 mission
Science (34.661)
A. M. Chatterjee, M. M. Gierach, **A. J. Sutton**, **R. A. Feely (OAR/PMEL)**, D. Crisp, A. Eldering, M. R. Gunson, C. W. O'Dell, B. B. Stephens, and D. S. Schimel

- Space-borne observations of CO_2 from the Orbiting Carbon Observatory-2 (OCO-2) are used here, for the first time, to characterize the tropical atmospheric CO_2 response to the strong El Niño event of 2015-2016.
- The recent OCO-2 space-based CO_2 observations demonstrate that the ocean does indeed play an early and important role in the response of atmospheric CO_2 concentrations to El Niño events – phenomenon inferred but not observed previously due to lack of high-density, broad-scale atmospheric CO_2 observations over the Tropics.
- This study provides observational evidence that oceans are important for regulating atmospheric CO_2 concentrations and global climate change.

Spaceborne observations of carbon dioxide (CO2) from the Orbiting Carbon Observatory-2 are used to characterize the response of tropical atmospheric CO2 concentrations to the strong El Niño event of 2015–2016. Although correlations between the growth rate of atmospheric CO2concentrations and the El Niño–Southern Oscillation are well known, the magnitude of the correlation and the timing of the responses of oceanic and terrestrial carbon cycle remain poorly constrained in space and time. We used space-based CO2 observations to confirm that the tropical Pacific Ocean does play an early and important role in modulating the changes in atmospheric CO2 concentrations during El Niño events—a phenomenon inferred but not previously observed because of insufficient high-density, broad-scale CO2 observations over the tropics.
Publication date: October 13, 2017
Available online: http://science.sciencemag.org/content/358/6360/eaam5776.full

The impact of anthropogenic land use/land cover change on regional climate extremes
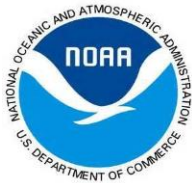
Nature Communications (12.124)
K. L. Findell, A. Berg, P. Gentine, **J. P. Krasting**, B. R. Lintner, **S. Malyshev**, J. A. Santanello Jr., and **E. Shevliakova (OAR/GFDL)**

- This research investigated how historical land use and land cover change influenced regional climate extremes of temperature and humidity.
- The change of near-surface temperatures in GFDL's earth system model (ESM2G) in response to deforestation is consistent with recent observations; in mid-latitude summers, crops and pastures are slightly warmer than nearby native forests.
- Conversion of deciduous forests to crops and pastures has led to a 2 to 4-fold increase in the occurrence of hot, dry summers in altered regions of the upper central U.S. and central Europe.
- This work highlights the importance of vegetation cover and land use practices for regional climate extremes.

Land surface processes modulate the severity of heat waves, droughts, and other weather extreme events. Vegetation and surface moisture conditions have been shown to impact both the severity and duration of heat wave events, as well as future aridity over land. An earth system model, GFDL's ESM2G, was used to investigate the regional impacts of historical anthropogenic land use/land cover change (LULCC) on combined extremes of temperature and humidity. The authors show that conversion of forests to cropland has contributed to much of the upper central U.S. and central Europe experiencing extreme hot, dry summers every 2-3 years instead of every 10 years. Assessing temperature and humidity offers a more complete measure of global change in extremes, as both are central to human experience of near-surface climate conditions. This work highlights the importance of vegetation cover and land use practices for regional climate extremes.
Acceptance date: August 8, 2017
Available online: https://www.nature.com/articles/s41467-017-01038-w

A communal catalogue reveals Earth's multiscale microbial diversity
Nature (40.137)
L. R. Thompson, J. G. Sanders, D. McDonald, A. Amir, J. Ladau, K. J. Locey, R. J. Prill, A. Tripathi, S. M. Gibbons, G. Ackermann, J. A. Navas-Molina, S. Janssen, E. Kopylova, Y. Vázquez-Baeza, A. González, J. T. Morton, S. Mirarab, Z. Zech Xu, L. Jiang, M. F. Haroon, J. Kanbar, Q. Zhu, S. J. Song, T. Kosciolek, N. A. Bokulich, J. Lefler, C. J. Brislawn, G. Humphrey, S. M. Owens, J. Hampton-Marcell, D. Berg-Lyons, V. McKenzie, N. Fierer, J. A. Fuhrman, A. Clauset, R. L. Stevens, A. Shade, K. S. Pollard, **K. D. Goodwin (OAR stationed at**
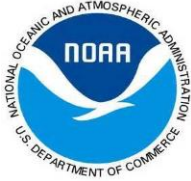
NMFS/SWFSC), J. K. Jansson, J. A. Gilbert, R. Knight, and The Earth Microbiome Project Consortium.

- This paper is a meta-analysis of the Earth Microbiome Project (EMP), a massively collaborative effort to characterize microbial life on this planet.
- The standardized collection, curation, and analysis enabled global patterns of microbial distribution to be revealed, and resulted in a queryable database of microbes across Earth's diverse environments.

Our growing awareness of the microbial world's importance and diversity contrasts starkly with our limited understanding of its fundamental structure. Despite recent advances in DNA sequencing, a lack of standardized protocols and common analytical frameworks impedes comparisons among studies, hindering the development of global inferences about microbial life on Earth. Here we present a meta-analysis of microbial community samples collected by hundreds of researchers for the Earth Microbiome Project. Coordinated protocols and new analytical methods, particularly the use of exact sequences instead of clustered operational taxonomic units, enable bacterial and archaeal ribosomal RNA gene sequences to be followed across multiple studies and allow us to explore patterns of diversity at an unprecedented scale. The result is both a reference database giving global context to DNA sequence data and a framework for incorporating data from future studies, fostering increasingly complete characterization of Earth's microbial diversity.

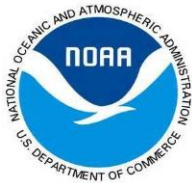Publication date: November 1, 2017
Available online: http://doi.org/10.1038/nature24621

Sea turtle bycatch mitigation in U.S. longline fisheries
Frontiers in Marine Science (N/A)
Y. Swimmer (NMFS/PIFSC), **A. Gutierrez (NMFS/OPR), K. Bigelow (NMFS/PIFSC)**, C. Barceló, **B. Schroeder (NMFS/OPR), K. Keene (NMFS/SEFSC)**, K. Shattenkirk, and **D. G. Foster (NMFS/SEFSC)**.

- This study investigated the relationships between the probability of expected turtle interactions and operational components of fishing location, hook type, bait type, sea surface temperature, and use of light sticks to evaluate the effectiveness of current regulations.
- Results found that the U.S. regulations have decreased bycatch of sea turtles in longline fisheries.

Capture of sea turtles in longline fisheries has been implicated in population declines of loggerhead (*Caretta caretta*) and leatherback (*Dermochelys coriacea*)

turtles. Since 2004, United States (U.S.) longline vessels targeting swordfish and tunas in the Pacific and regions in the Atlantic Ocean have operated under extensive fisheries regulations to reduce the capture and mortality of endangered and threatened sea turtles. We analyzed 20+ years of longline observer data from both ocean basins during periods before and after the regulations to assess the effectiveness of the regulations. Using generalized additive mixed models (GAMMs), we investigated relationships between the probability of expected turtle interactions and operational components such as fishing location, hook type, bait type, sea surface temperature, and use of light sticks. GAMMs identified a two to three-fold lower probability of expected capture of loggerhead and leatherback turtle bycatch in the Atlantic and Pacific when circle hooks are used (vs. J hook). Use of fish bait (vs. squid) was also found to significantly reduce the capture probability of loggerheads in both ocean basins, and for leatherbacks in the Atlantic only. Capture probabilities are lowest when using a combination of circle hook and fish bait. Influences of light sticks, hook depth, geographic location, and sea surface temperature are discussed specific to species and regions. Results confirmed that in two U.S.-managed longline fisheries, rates of sea turtle bycatch significantly declined after the regulations. In the Atlantic (all regions), rates declined by 40 and 61% for leatherback and loggerhead turtles, respectively, after the regulations. Within the NED area alone, where additional restrictions include a large circle hook (18/0) and limited use of squid bait, rates declined by 64 and 55% for leatherback and loggerhead turtles, respectively. Gains were even more pronounced for the Pacific shallow set fishery, where mean bycatch rates declined by 84 and 95%, for leatherback and loggerhead turtles, respectively, for the post-regulation period. Similar management approaches could be used within regional fisheries management organizations to reduce capture of sea turtles and to promote sustainable fisheries on a global scale.
Publication date: August 25, 2017
Available online:
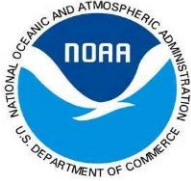https://www.frontiersin.org/articles/10.3389/fmars.2017.00260/full

Comparative application of trophic ecosystem models to evaluate drivers of endangered Hawaiian monk seal populations
Marine Ecology Progress Series (2.619)
M. Weijerman, S. Robinson, F. Parrish, J. Polovina, and C. Littnan (NMFS/PIFSC)

- This study compared the ecosystem structure and energy flow in two subpopulations of monk seals with varying rates of decline to determine what may be driving productivity in these subpopulations.
- Results found that prey biomass, impacted by bottomfish removals, had a strong impact on the historical declining monk seal population trend.

The Northwestern Hawaiian Islands share comparable biological community structures and have similar histories of fishing pressure, yet monk seal subpopulations show different trends of decline between locations. Using trophic models, we compared ecosystem structure and energy flows supporting 2 subpopulations (on Laysan Island and French Frigate Shoals (FFS) atoll), each with varied rates of decline (1998−2015). Through simulated perturbations, we showed that the Laysan community had much higher productivity and was mainly forced by bottom-up processes, but prey and predator abundance also controlled the energy flow and community structure. The FFS ecosystem was less productive and strongly influenced by a change in primary productivity. Although the FFS system responded to a change in predator and prey abundance, the monk seals were more influenced by benthic bottomfish biomass than by a change in predator abundance. We clarified the role of external drivers (Pacific Decadal Oscillation [PDO] and benthic bottomfish fishery): while the PDO did show correlation with monk seal population trends, the best models were driven by prey biomass as impacted by bottomfish removals. However, monk seal predator and prey trophic dynamics were not sufficient to explain the observed decline in monk seal biomass. We suggest that other factors amplifying mortality played a role; for example, shark predation on monk seal pups at FFS. Because of the uncertainties inherent in a complex ecosystem model, the results cannot be used for tactical management but they can help direct management or future research efforts in the recovery of the endangered monk seal population.
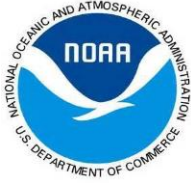
CROSS LINE OFFICE ARTICLES

Biogeography of seabirds within a high-latitude ecosystem: Use of a data assimilative ocean model to assess impacts of mesoscale oceanography
Journal of Marine Systems (2.608)

J. Santora, **L. B. Eisner (NMFS/AKFSC)**, K. J. Kuletz, **C. Ladd (OAR/PMEL)**, M. Renner, and G. L. Hunt Jr.

- Latitudinal changes in richness and abundance in seabird assemblages indicates a major shift around 59–60°N within inner and middle shelf regions, but not in the outer shelf.
- Latitudinal shifts in seabird assemblages in the middle shelf strongly related to hydrographic structure, as opposed to the inner and outer shelf waters.
- The oceanographic model used captured mesoscale variability of ocean conditions important for understanding seabird distributions and represents an important step for evaluating modeling and empirical studies.

We assessed the biogeography of seabirds within the Bering Sea Large Marine Ecosystem (LME), a highly productive and extensive continental shelf system that supports important fishing grounds. Our objective was to investigate how physical ocean conditions impact distribution of seabirds along latitudinal gradients. We tested the hypothesis that seabird biogeographic patterns reflect differences in ocean conditions relating to the boundary between northern and southern shelf ecosystems. We used a grid-based approach to develop spatial means (1975–2014) of summertime seabird species' abundance, species' richness, and a multivariate seabird assemblage index to examine species composition. Seabird indices were linked to ocean conditions derived from a data-assimilative oceanographic model to quantify relationships between physics (e.g., temperature, salinity, and current velocity), bathymetry and seabirds along latitudinal gradients. Species assemblages reflected two main sources of variation, a mode for elevated richness and abundance, and a mode related to partitioning of inner/middle shelf species from outer shelf-slope species. Overall, species richness and abundance increased markedly at higher latitudes. We found that latitudinal changes in species assemblages, richness and abundance indicates a major shift around 59–60°N within inner and middle shelf regions, but not in the outer shelf. Within the middle shelf, latitudinal shifts in seabird assemblages strongly related to hydrographic structure, as opposed to the inner and outer shelf waters. As expected, elevated species richness and abundance was associated with major breeding colonies and within important coastal foraging areas. Our study also indicates that seabird observations supported the conclusion that the oceanographic model captured mesoscale variability of ocean conditions important for understanding seabird distributions and represents an important step for evaluating modeling and empirical studies. Biogeographic assessments of LMEs that integrate top predator distributions resolve critical habitat requirements and will benefit assessment of climate change impacts (e.g., sea-ice loss) predicted to affect high-latitude marine ecosystems.
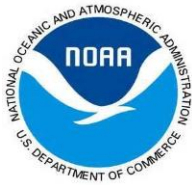
The role of shellfish aquaculture in reduction of eutrophication in an urban estuary

Environmental Science & Technology (5.330)

S. B. Bricker (NOS/NCCOS), J. G. Ferreira, C. Zhu, **J. M. Rose (NMFS/NEFSC), E. Galimany (NMFS/NEFSC), G. Wikfors (NMFS/NEFSC)**, C. Saurel, R. L. Miller, J. Wands, P. Trowbridge, R. Grizzle, K. Wellman, R. Rheault, **J. Steinberg (NOS/NCCOS)**, **A. Jacob (NOS/NCCOS)**, **E. D. Davenport (NOS/NCCOS)**, S. Ayvazian, M. Chintala, and M. A. Tedesco

- This study examined 'bioextraction' of nutrients from the water by oyster aquaculture in Long Island Sound, Connecticut, as an example of how aquaculture might complement land-based measures in urban estuaries.
- System-scale modeling estimated that current oyster aquaculture, via sequestration into tissue and shell only, removes an equivalent of 1.31%, and expanded production could remove 2.68%, of total annual land-based nitrogen inputs by aquaculture alone.
- The minimum value of the ecosystem service of nitrogen removed by oyster production was estimated by means of an avoided costs method, which uses the cost of alternative nutrient management measures such as wastewater treatment and urban Best Management Practices to estimate the value of the removed nitrogen, to be $8.5 million per year, with maximum value at expanded production of $470 million per year.
- These optimistic results are specific to Long Island Sound but the modeling approach is transferable and can be used to evaluate possible contribution by shellfish aquaculture in other urban estuaries.

Mitigating coastal eutrophication is a global challenge. In many places where land-based management has reduced nutrient discharges, coastal water bodies remain impaired. This study examined 'bioextraction' of nutrients from the water by oyster aquaculture in Long Island Sound, Connecticut, as an example of how aquaculture might complement land-based measures in urban estuaries. Eutrophication status, nutrient removal, and ecosystem service value were estimated through eutrophication assessment, application of hydrologic, circulation, and local- and ecosystem-scale models, and economic valuation. System-scale modeling estimated that current oyster aquaculture, via sequestration into tissue and shell only, removes an equivalent of 1.31%, and expanded production could remove 2.68%, of total annual land-based nitrogen inputs by aquaculture alone. Up-scaled

local-scale results were similar to results from the system-scale modeling, suggesting that this upscaling method could be useful in waterbodies without circulation models. The minimum value of the ecosystem service of nitrogen removed by oyster production was estimated by means of an avoided costs method, which uses the cost of alternative nutrient management measures such as wastewater treatment and urban Best Management Practices to estimate the value of the removed nitrogen, to be $8.5 million per year, with maximum value at expanded production of $470 million per year. Removal and value estimates are conservative because they do not include removal by clams in Connecticut due to the lack of a clam model, or by oysters and clams in New York due to data limitations, nor denitrification losses. If oyster associated removal from all Connecticut and New York lease acres (5% of bottom area) and denitrification losses for both states are included, nitrogen removal estimates increase to 10% - 30% of total annual inputs. The total N removal could be higher if removal by clams is included. Additional research is needed for inclusion of shellfish growers in nutrient trading programs. These optimistic results are specific to Long Island Sound but the modeling approach is transferable and can be used to evaluate possible contribution by shellfish aquaculture in other urban estuaries.
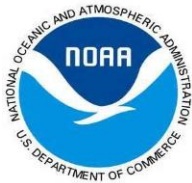Publication date: October 10, 2017
Available online: http://pubs.acs.org/doi/abs/10.1021/acs.est.7b03970

Brevetoxin exposure in sea turtles in south Texas during Karenia brevis *red tide*
Diseases of Aquatic Organisms (2.71)
J. S. Walker, D. J. Shaver, **B. A. Stacy (NMFS/OPR)**, L. J. Flewelling, **M. H. Broadwater (NOS/NCCOS)**, and Z. Wang

- This study is the first scientific report of a sea turtle mortality event from exposure to red tides (brevetoxin exposure) in Texas.
- 10 of 11 Kemp's ridleys and 2 of 5 greens died from brevetoxicosis, which was caused by the ingestion of the toxin, and all 16 stranded turtles had detectable levels of brevetoxins.
- This indicates the impact red tides could have on marine turtle species, previously suspected but not documented.

Five green (*Chelonia mydas*) and 11 Kemp's ridley (*Lepidochelys kempii*) sea turtles found dead, or that died soon after stranding, on the southern Texas coast during 2 *Karenia brevis* blooms (October 2015, September–October 2016) were tested for exposure to brevetoxins. Tissues (liver, kidney) and digesta (stomach and intestinal contents) were analyzed by ELISA. Three greens found alive during the 2015 event and 2 Kemp's ridleys found alive during the 2016 event exhibited signs

of brevetoxin exposure, including lethargy and/or convulsions of the head and neck. Brevetoxins (PbTx) were detected in one or more tissues or digesta in all 16 stranded turtles. Detected PbTx concentrations ranged from 2 ng g-1 to >2000 ng g-1. Necropsy examination and results of brevetoxin analysis indicated 10 of the Kemp's ridleys and 2 of the greens died from brevetoxicosis via ingestion. This is the first documentation of sea turtle mortality in Texas attributed to brevetoxicosis.
Acceptance date: November 15, 2017
Available online: https://doi.org/10.3354/dao03194

Continuous light absorption photometer for long-term studies
Atmospheric Measurement Techniques (3.089)
J. A. Ogren (NWS/OAA), J. Wendell (OAR/ESRL), E. Andrews (OAR/ESRL), and P. J. Sheridan (OAR/ESRL)

- This study developed a new photometer for continuous measurements of aerosol light absorption coefficient for long-term studies.

A new photometer for continuous measurements of aerosol light absorption coefficient, optimized for long-term studies of the climate-forcing properties of aerosols, is described. Measurements of the light attenuation coefficient are made at blue, green, and red wavelengths, with a detection limit of 0.02 Mm−1 and a precision of 4% for hourly averages. The uncertainty of the light absorption coefficient is primarily determined by the uncertainty of the correction scheme commonly used to convert the measured light attenuation to light absorption coefficient, and ranges from about 20% at sites with high loadings of strongly-absorbing aerosols up to 100% or more at sites with low loadings of weakly-absorbing aerosols. Much lower uncertainties (ca. 40%) for the latter case can be achieved with an advanced correction scheme.
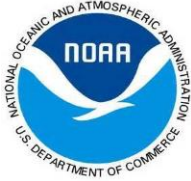Acceptance date: July 24, 2017
Available online: https://www.atmos-meas-tech-discuss.net/amt-2017-212/

Timing of sea-ice-retreat affects the distribution of seabirds and their prey in the southeastern Bering Sea
Marine Ecology Progress Series (2.619)
G. L. Hunt, Jr., M. Renner, **K. Kuletz**, **S. Salo (OAR/PMEL)**, **L. Eisner (NMFS/AKFSC)**, **P. Ressler (NMFS/AKFSC)**, **C. Ladd (OAR/PMEL)**, and J. A. Santora

- This study investigated how the cross-shelf distribution of seabirds and their potential prey respond to inter-annual variation in the timing of sea-ice-retreat in the southeastern Bering Sea.

- Results show that shifts in seabird distributions between years with early and late ice retreat indicate the importance of sea-ice retreat for structuring trophic interactions (e.g. interactions between seabirds and their zooplankton or forage fish prey).

The potential impacts of future climate warming on marine ecosystems can be assessed by examining the effects of present-day variation in climate. Here we report how the cross-shelf distributions of seabirds and their potential prey responded to inter-annual variation in the timing of sea-ice-retreat in the southeastern Bering Sea. We expected that, in years of early sea-ice-retreat, prey resources would be scarce over the shelf, and that seabird species would concentrate in frontal regions where the availability of zooplankton and forage fish might be enhanced. To test this hypothesis, we used a forty-year database of the distribution of marine birds and recently available data on the distribution of zooplankton and forage fish. We found that, although there were substantial changes in the distribution of seabird species between years with early and late sea-ice-retreat, there was no overall shift into frontal regions. Instead, in years with early sea-ice-retreat, there was a strong tendency for seabird species that foraged off the shelf to move toward the shelf, or onto the shelf, whereas inshore-foraging species shifted seaward. In years with early sea-ice-retreat, the cross-shelf centers of abundance of the copepod *Calanus marshallae/glacialis* shifted seaward, but there was little change in the cross-shelf distributions of Neocalanus spp. copepods, euphausiids (primarily Thysanoessa spp.) and age-0 pollock (*Gadus chalcogrammus*). Shifts in seabird distributions, as demonstrated in this study, indicate the importance of sea-ice retreat for structuring trophic interactions and could present both opportunities and challenges for central-place-foraging breeding seabirds and long-distance migratory species.
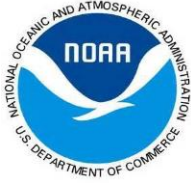Acceptance date: October 25, 2017
Available online: N/A

ADDITIONAL ARTICLES

NMFS Publications

Evaluation of robust single-species harvest control rules for managing reef fish in the Gulf of Mexico
Marine and Coastal Fisheries (1.810)
M. Masi, C. H. Ainsworth, **I. C. Kaplan (NMFS/NWFSC)**, and **M. J. Schirripa (NMFS/SEFSC)**

- This study investigates the effect of trophic interactions on the development of effective, adaptive management strategies for reef fish in the Gulf of Mexico by using an Atlantic model to evaluate performance of a 2-point harvest control rule.
- Results suggest that yield of some harvest fish and some ecosystem metrics may improve under certain cases where the most abundant, largest reef fish are exploited at higher rates.
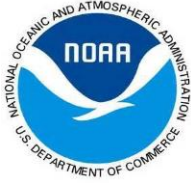
This study highlights the importance of inter-specific interactions among marine organisms and the effect that these trophic interactions have on the development of effective, adaptive management strategies for reef fishes in the Gulf of Mexico. To represent the spatially and temporally constrained, inter-specific interactions among reef fishes we employ Atlantis (a spatially explicit, biogeochemical ecosystem model) as our simulation tool. Within Atlantis, we evaluate the performance of a 2-point harvest control rule that adaptively increases fishing mortality linearly between upper and lower biomass thresholds based on the available biomass of the stock(s). This example demonstrated the use of a blanket, 2-point HCR that assesses the available biomass of several reef fish species (often co-caught in fishing gear) both simultaneously and objectively. To estimate the impact of reef fish fishing on species abundance and biodiversity in the ecosystem, we examine four low and four high fishing mortality scaler scenarios. All model projections are forward-looking, representing a fifty-year time horizon (2010 to 2060). We evaluate the performance of the 2-point harvest control rules under the eight fishing mortality scenarios using ecosystem metrics that were previously found to robustly track changes in ecosystem function caused by fishing. We found that the lower F scenarios produced an ecologically distinct ecosystem state compared to the higher F scenarios, where relatively higher levels of fishing mortality (particularly on predators such as the Deep Serranidae group) resulted in an increase in prey availability in later years of the simulation. This led to an increase in the overall productivity of the ecosystem over time, and higher catch and biomass of most other reef fish groups at equilibrium (year 50). Our results suggest that a better understanding of inter-specific interactions among targeted reef fishes and their prey is critical to developing ecosystem-based management strategies for the Gulf of Mexico.

Acceptance date: October 26, 2017
Available online: N/A

Modeling local adaptation and gene flow in sockeye salmon
Ecosphere (2.595)

J. E. Lin, **J. J. Hard (NMFS/NWFSC)**, R. Hilborn, and L. Hauser

- In this study, an individual-based model was created that simulates evolutionary and demographic effects of migration and selection in interconnected sockeye salmon.
- The opposing effects of natural selection and selective harvest can have important consequences for salmon production: strong stabilizing selection often causes salmon to evolve morphologies that are likely to increase their vulnerability to fisheries.
- The demographic and evolutionary consequences of interactions between different sources of selection for salmon populations have implications for sustainability of natural production in the face of anthropogenic pressures and systemic environmental change.
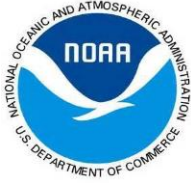
Micro evolutionary processes determine levels of local adaptation within wild populations and presumably affect population productivity, but phenotypic evolution has not often been linked explicitly to population dynamics. Here, we describe a stochastic, individual-based model that simulates evolutionary and demographic effects of migration and selection in interconnected sockeye salmon (*Oncorhynchus nerka*) populations. Two populations were simulated based on parameters obtained empirically from wild populations in the Bristol Bay region of southwestern Alaska, representing beach and stream spawning ecotypes. Individuals underwent a full salmonid life cycle, experiencing sexual selection, size-selective harvest, and predation based on body length at maturity. Stabilizing natural selection on the three traits (body length, body depth, and age at maturity) tracked for all individuals favored different phenotypes in the two ecotype populations, and the three traits evolved in a genetically correlated manner. Simulation results showed that stabilizing selection on fish phenotypes was always critical for maintaining local adaptation, especially when dispersal rates were high, but loss of local adaptation did not result in substantial loss of productivity. Rather, productivity was more strongly influenced by the opposing effects of stabilizing and harvest selection; strong stabilizing selection caused the salmon to evolve larger body sizes that made them more likely to be caught in the fishery. The model results suggest that interactions between different selection pressures can have substantial demographic as well as evolutionary consequences in wild salmon populations, with implications for sustainability of natural production in the face of selective harvest and systemic environmental change.

*Two new species of Suberitida (*Porifera, Heteroscleromorpha*) from the Bering Sea*
Zootaxa (0.994)
H. Lehnert, and **R. P. Stone (NMFS/AFSC)**

- Two new species of sponge are described, both new genera to the North Pacific Ocean.
- One common species grows on the carapaces of a common crab in the region. Using the terminal molt status and other life history factors we can accurately estimate a growth rate for the sponge. This represents one of the few known growth rates for any sponge in the North Pacific Ocean and indicates that for some sponges growth rates may be much faster than previously estimated.
- The above observation provides much needed information for recovery rates of an important group of habitat forming biota.

Two new species, *Plicatellopsis borealis* and *Spongosorites beringensis*, from the Bering Sea are described; both belong to genera previously not reported from the area. The genus *Plicatellopsis*, Burton, 1932 (Porifera, Suberitida, Suberitidae) contains five valid species, all recorded from the southern hemisphere. The record of *P. borealis* n. sp. from the Bering Sea is consequently the first record of the genus from the northern hemisphere. The new species is described and compared to all congeners. The genus *Spongosorites*, Topsent, 1896 (Porifera, Suberitida, Halichondiidae) contains 22 valid species but none reported from the North Pacific Ocean, Bering Sea or the Arctic Ocean. The geographically closest records are six species occurring in the North Atlantic Ocean. So the description of *Spongosorites beringensis* is the first record of the genus in the region.
Publication date: October 26, 2017
Available online: http://www.mapress.com/j/zt/article/view/zootaxa.4338.3.9

*Expanding the coastal forager paradigm: Long-term pelagic habitat use by green turtles (*Chelonia mydas*) in the eastern Pacific Ocean*
Marine Ecology Progress Series (2.619)
C. T. Tomaszewicz C. (NMFS/SWFSC), **J. Seminoff (NFMS/SWFSC)**, **L. Avens (NMFS/SEFSC)**, **L. Goshe (NMFS/SEFSC)**, J. Rguez-Baron, S. Peckham, and C. Kurle

- Identifies long-term habitat use by East Pacific green turtles of a pelagic foraging area off the coast of the Baja California Peninsula, a region where turtles are known to interact with local fisheries.
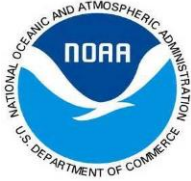
- Presents the first empirical evidence for age-at-maturation for East Pacific green turtles (~17 years for smaller nesters like those at Michoacán, and ~30 years for larger nesters like those at Revillagigedos Archipelago).
- Also empirically estimates the age of settlement for East Pacific green turtles to neritic coastal habitats from their oceanic juvenile stage of less than 10 years old, most likely ~3 to 5 years old.

The East Pacific green turtle (*Chelonia mydas*) population is gradually recovering, yet much remains unknown about their long-term demographics and habitat use due to their inaccessibility for study. We present the first detailed characterization of age-at-settlement (~3-5 years), age-at-maturity (~17-30 years), and long-term resource use patterns for these turtles by combining skeletochronology with stable carbon (δ13C) and nitrogen (δ15N) isotope analysis of annual bone growth layers. We studied dead green turtles stranding along the Baja California Peninsula (BCP) at Playa San Lázaro (PSL) in Mexico, where their deaths are presumed a result of regional fisheries bycatch. Our stable isotope (SI) results indicate these turtles utilize resources differently than other regional, lagoon-foraging green turtle aggregations. Based on SI values from multiple years for individual turtles, we propose these green turtles are long-term pelagic foragers in the coastal shelf habitat of the Gulf of Ulloa and consume a more carnivorous diet from the epipelagic zone, likely including fishery discards, similar to a sympatric group of foraging North Pacific loggerheads. Thus, they use the Gulf of Ulloa as more than a transit area between benthic lagoon foraging and/or breeding locations. This unexpected and prolonged use of a pelagic foraging area could benefit the turtles by facilitating increased somatic growth, but may be of conservation concern as this area also experiences high fisheries turtle bycatch rates. Our findings expand the current paradigm of green turtle life history and habitat use by demonstrating an unexpected exploitation of habitat and prey for post-oceanic stage turtles.
Acceptance date: October 18, 2017
Available online: N/A

*Otolith chemistry of juvenile walleye pollock (*Gadus chalcogrammus*) in relation to regional hydrography: Evidence of spatially split cohorts*
Marine Ecology Progress Series (2.619)
M. Wilson, **A. Dougherty**, **E. M. Matta (NMFS/AKFSC)**, and J. Miller
- Uses otolith chemistry to show a two part cohort split in Western Gulf of Alaska juvenile walleye pollock which supports one of the world's largest fisheries.
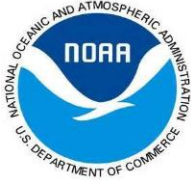
- This split was found in two separate years and agrees with demographic information.
- This split may add resilience to the population by buffering against density dependence and downstream larval transport.

For many marine ecosystems, uncertainty about nursery location and juvenile-fish spatial dynamics impedes our understanding of fish production. Walleye pollock (*Gadus chalcogrammus*) occur throughout the coastal North Pacific Ocean and support some of the world's largest fisheries. We used otolith microchemistry to answer questions about whether cohorts of young-of-the-year (Age-0) walleye pollock are spatially split in the western Gulf of Alaska (GOA). Demographics indicate a possible cohort split between habitat influenced by the Alaska Coastal Current (ACC) (Semidi regions) and habitat more influenced by oceanic influxes (Kodiak region). We used a regionally stratified-random scheme to select 204 Age-0 juveniles collected with a small-mesh trawl during late-summer 2007 and 2011. Laser ablation-inductively coupled plasma mass spectrometry was then used to measure the composition of elements assimilated into their otoliths within 1 wk of capture (otolith edge) and over their life histories (otolith edge to core). Otolith edge chemistry varied by region of capture primarily in strontium:calcium (Sr:Ca), barium:Ca (Ba:Ca), and manganese:Ca (Mn:Ca). Semidi-region otoliths were discriminated from Kodiak otoliths by lower Sr:Ca and higher Ba:Ca and Mn:Ca with 78% (2007) and 79% (2011) success. We estimated that exchange between these 2 habitats was limited for >3 (2007) and >7 (2011) weeks, sufficient to explain observed demographic differences. We hypothesize that a Semidi-Kodiak split buffers the western GOA population against losses due to density-dependent mechanisms and downstream transport.
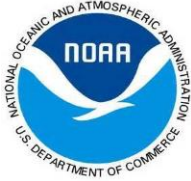
Exploring public knowledge, attitudes, and perceptions of the Marianas Trench Marine National Monument
Coastal Management (1.861)
D. M. Kotowicz, L. Richmond, and **J. Hospital (NMFS/PIFSC)**

- To truly understand local perceptions of LMPAs, it may be important to combine qualitative assessments of stakeholders' opinions with quantitative work to understand how the broader public feels about the initiative.
- Social science can and should play an important role in future LMPA management plans and research agendas.

With the increase in the development of large marine protected areas (LMPAs) worldwide, there have been calls from social scientists to gather better empirical information about the human dimensions of LMPAs. Of the social research done on LMPAs to date, most has focused on the perceptions of stakeholders closely connected to the implementation of LMPAs, and little research has explored the general public's response to LMPAs. This paper presents the results of a phone survey conducted in the US territories of Guam and the Commonwealth of the Marianas Islands (CNMI) to assess residents' knowledge, attitudes, and perceptions of the Marianas Trench Marine National Monument – an offshore LMPA designated in 2009. The survey was administered in 2012 to 500 randomly-selected residents from each territory. Findings suggested: 1. public awareness of the Monument prior to the survey was low; 2. residents generally supported designation of the LMPA; 3. most residents did not believe that the Monument would affect them or their community; and 4. knowledge and perceptions of the Monument varied between fishing and non-fishing households. These findings may be important for management of LMPAs into the future.
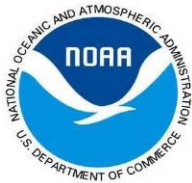
NWS Publications

Observations of right-moving supercell motion forecast errors
Weather and Forecasting (1.972)
M. J. Bunkers (NWS)

- Forecasters can ascribe varying levels of confidence to forecast storm motions depending on observable environmental variables. Supercells that move farther to the right of the expected storm motion may carry a higher risk of tornadoes.
- This study evaluates reliability of forecast supercell motions given varying observed environmental parameters. Results from this study suggest considering environmental and storm-related variables in forecast error could improve tornado warning statistics.

Two shear-based supercell motion forecast methods are assessed to understand how each method performs under differing environmental conditions for observed right-moving supercells. Accordingly, a 573-case observational dataset is partitioned into small versus large values of environmental and storm-related variables such as bulk wind shear, convective available potential energy, mean wind, storm motion, and storm-relative helicity (SRH). In addition, hodographs are

partitioned based on tornado damage scale, as well as where the storm motion falls among the four quadrants. With respect to the 573-case dataset, the largest supercell motion forecast errors generally occur when the (i) observed midlevel (4–5 km AGL) storm-relative winds are either anomalously weak or strong, (ii) observed 0–3-km AGL SRH is large, (iii) supercell motion is fast, (iv) convective inhibition is strong, or (v) the surface–500-mb RH is low. Moreover, significantly tornadic supercells are biased 1.2 m s⁻¹ slower and farther right of the hodograph than predicted by the Bunkers forecast method, but show very small bias for the modified Rasmussen-Blanchard method (though errors are a little larger for this method). Conversely, the smallest errors occur when, relative to the overall sample, the (i) observed upper-level (9–10 km AGL) storm-relative winds are strong, (ii) supercell motion is slow or the mean wind is weak, (iii) surface–500-mb RH is high, or (iv) convective inhibition is weak. Errors also are relatively small when storm motion lies in the lower-left hodograph quadrant.
Acceptance date: November 22, 2017
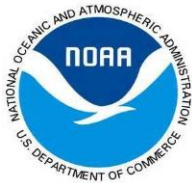Available online: http://journals.ametsoc.org/doi/abs/10.1175/WAF-D-17-0133.1

NESDIS Publications

Quantitative assessment of carbon sequestration reduction induced by disturbances in temperate Eurasian steppe
Environmental Research Letters (3.906)
Y. Chen, W. Ju, **P. Groisman (NESDIS)**, J. Li, P. Propastin, X. Xu, W. Zhou, and H. Ruan
- This study found that heavy domestic grazing in relatively barren grasslands substantially reduced carbon sequestration, particularly in the grasslands of Turkmenistan, Uzbekistan, and the far southwest of Inner Mongolia.

The temperate Eurasian steppe (TES) is a region where various environmental, social, and economic stresses converge. Multiple types of disturbance exist widely across the landscape, and heavily influence carbon cycling in this region. However, a current quantitative assessment of the impact of disturbances on carbon sequestration is largely lacking. In this study, we combined the boreal ecosystem productivity simulator (BEPS), the Shiyomi grazing model, and the global fire model (Glob-FIRM) to investigate the impact of the two major types of disturbance in the TES (i.e. domestic grazing and fire) on regional carbon sequestration. Model performance was validated using satellite data and field observations. Model outputs indicate that disturbance has a significant impact on carbon sequestration at a regional scale. The annual total carbon lost due to

disturbances was 7.8 TgC yr−1, accounting for 14.2% of the total net ecosystem productivity (NEP). Domestic grazing plays the dominant role in terrestrial carbon consumption, accounting for 95% of the total carbon lost from the two disturbances. Carbon losses from both disturbances significantly increased from 1999 to 2008 ($R^2 = 0.82$, $P < 0.001$ for grazing, $R^2 = 0.51$, $P < 0.05$ for fire). Heavy domestic grazing in relatively barren grasslands substantially reduced carbon sequestration, particularly in the grasslands of Turkmenistan, Uzbekistan, and the far southwest of Inner Mongolia. This spatially explicit information has potential implications for sustainable management of carbon sequestration in the vast grassland ecosystems.

Publication date: 10/31/2017

Available online: http://iopscience.iop.org/article/10.1088/1748-9326/aa849b